

**REMARKS**

The Non-Final Office Action has been carefully reviewed and the following remarks are made in light of the Action.

The specification has been amended to correct the alfalfa germplasm designated “CW-83201” to “CW-83021”. These are mere typographic errors. Applicants respectfully submit that the correct designation for this alfalfa germplasm should be “CW-83021”, not “CW-83201,” as evidenced throughout the as-filed specification. See, for example, Table 1, second entry; Table 3, second entry; Table 4, second entry; Table 5, first entry; Table 6a, second entry; Table 6b, third entry; Table 7a, sixth entry; Table 7b, fourteenth entry; Table 7c, seventh entry; Table 7d, eighteenth entry; and, numerous occurrences elsewhere. Also, the specification of U.S. Provisional Application No. 60/422,857 filed on November 1, 2002, of which the present application claims benefit, discloses the correct designation for this alfalfa germplasm as ‘CW-83021.’ The specification has also been amended to correct typographic errors by changing “Marshall” to “Marshal” in Table 4 and Table 7d. “Marshal” is the correct variety name according to Organization for Economic Cooperation and Development seed list.

Claim 15 has been amended to recite the limitation that the claimed alfalfa variety comprises 'French' type alfalfa germplasm, as suggested by the Examiner. Support for this can be at least found in the paragraph bridging pages 4-5; page 25, lines 15-21; page 30, lines 3-9; page 35, lines 16-22; and, page 40, lines 13-22. Claim 17 has been amended to correct a typographic error. Claim 31 was been amended to add dependency to claim 15 so as to specify that one type of ‘French’ alfalfa germplasm is the ‘Flemish’ type. Support can be found at least in the paragraph bridging pages 4-5. Claim 30 has been amended to include Markush Groups for each of the distinguishing traits (i.e., “greater faster recovery after spring-green up or after harvest” and “greater more erect stems at late (i.e. 75%) bloom.”). Support can be found at least on page 6, lines 10 to 26 of the specification and in the claims as originally filed. Claim 19 has been amended to further clarify the claim.

No new matter has been added by way of these amendments. Entry and consideration of the foregoing amendments is respectfully requested.

## **RESPONSE**

### **I. Objection to the Specification**

Applicants have amended the specification with appropriate corrections as required.

Examiner is requested to remove the objection to the specification in light of these amendments.

### **II. Claim Rejections – 35 USC § 112, First Paragraph – Written Description**

Claims 2-4 and 6-19 stand rejected under 35 USC § 112, first paragraph, as allegedly failing to comply with the written description requirement. More specifically, the Office Action alleges that the specification does not support alfalfa varieties having the claimed characteristics wherein said varieties were not developed using ‘French’ lines in the initial step. However, the Examiner admitted that the specification teaches alfalfa varieties having the claimed characteristics wherein said varieties were developed using ‘French’ lines in the initial step.

Applicants have amended independent claim 15 to recite the limitation that the claimed alfalfa varieties comprise “‘French’ type alfalfa germplasm.” All claims depending from claim 15 now have the same limitation.

Applicants maintain the right to pursue broader claims in one or more continuation or divisional applications.

The Examiner is respectfully requested to withdraw this rejection and issue the pending claims in light of this amendment.

### **III. Claim Rejections – 35 USC § 112, First Paragraph – Enablement**

Claims 2-4, 6-19 and 30-31 are rejected under 35 USC § 112, first paragraph, as allegedly failing to comply with the enablement requirement. More specifically, the rejection alleges that there is no guidance regarding the ‘French’ lines used to produce the claimed invention.

As an initial matter, the Applicant makes the following statements regarding ATCC Deposit Nos. PTA-5346, PTA-5347, PTA-5348 and PTA-5349 as requested by the Examiner:

- (a) during the pendency of this application, access to the invention will be afforded to the Commissioner upon request;

- (b) all restrictions upon availability to the public will be irrevocably removed upon granting of the patent;
- (c) the deposit will be maintained in a public depository for a period of 30 years or 5 years after the last request or for the enforceable life of the patent, whichever is longer;
- (d) a test of the viability of the biological material at the time of the deposit showed that the deposited samples were viable; and
- (e) the deposit will be replaced if it should ever become inviable.

Applicants respectfully submit that the specification provides sufficient description of 'French' lines to enable one skilled in the art to make and use the claimed invention. For example, the paragraph beginning at page 4, line 17 of the specification describes 'French' types of alfalfa, including that "[T]he 'French' types of alfalfa include 'Flemish' (or Flamande), Poitou, and Provence." Furthermore, each of the Examples provided in the as-filed specification describing the breeding schemes used to develop the exemplary alfalfa varieties of the instant invention state that 'French' type germplasm was used in their development.

The disclosure in the specification also includes citations to publications providing additional information on 'French' types of alfalfa, wherein such publications were publicly available 18 years or more before the priority filing date of the instant application (i.e., well before November 1, 2002). See, for example, the two publications regarding 'French' alfalfa types cited in the paragraph bridging pages 4-5 (i.e., Barnes et al., 1977, Alfalfa germplasm in the United States: Genetic vulnerability, use, improvement, and maintenance. USDA Tech. Bull. 1571; and Miller and Melton, 1983, Description of Alfalfa Germplasm Cultivars and Germplasm Sources. New Mexico Agric. Exp. Stn. Special Report 53), each of which is incorporated by reference at page 1, lines 17-19 of the specification. A copy of Barnes et al. (1977) was submitted to the USPTO with the Information Disclosure Statement filed on September 29, 2004, and a complete copy of Miller and Melton, 1993 (498 pages) is submitted to the USPTO concurrently with this response. Based on the disclosure in the as-filed specification and the cited publications incorporated by reference into the specification, one skilled in the art of alfalfa breeding had sufficient knowledge as of the priority filing date of the instant application

regarding what alfalfa germplasm consisted of “French” type alfalfa germplasm. Thus, the instant invention as presently claimed was fully enabled as of its priority filing date.

Barnes et al. describe ‘Flemish’ alfalfas, and varieties developed from ‘Flemish’ alfalfas, in some detail. ‘Flemish’ alfalfas are specifically mentioned in the as-filed specification as one of the ‘French’ type alfalfas. A description of the ‘Flemish’ alfalfas is provided at least in the following examples cited from Barnes et al.:

- Paragraph bridging pages 2-3 provides details on ‘Flemish’ alfalfa germplasm, including a listing of representative varieties and providing a description of their phenotypes. See for example the following description:

“The performance of all ‘Flemish’ varieties is similar and can be characterized as being fast to recover after cutting, early to mature, vigorous, stemmy, generally resistant to foliar diseases, susceptible to crown and root diseases, and moderately winter hardy. ‘Flemish’ alfalfas appear to contain only *Medicago sativa* germplasm.”

- Page 3, Figure 1 provides a world map showing that the ‘Flemish’ alfalfa germplasm is from France;
- Table 1, pages 5-8, provides a list of various alfalfa varieties in North America and their parental origins, wherein such varieties were developed by 1977. The origins of 17 varieties are listed as ‘Flemish’ or ‘Flamande,’ which are summarized in Exhibit A attached hereto, including the variety ‘Europa’.<sup>1</sup>
- Table 2, pages 9-12, provides the percent parental genotypes (including ‘Flemish’) for alfalfa varieties developed by 1977. Thirty nine (39) alfalfa cultivars listed in the table have at least some proportion of ‘Flemish’ germplasm, which are summarized in Exhibit B attached hereto.
- Table 3, page 13, provides a list of available alfalfa plant introductions, including ‘Flemish’ which is indicated as having a country of origin of Belgium and France;
- Page 14 provides a discussion of the “characteristics needed in alfalfa varieties” for the United States. More specifically, it states that “[S]mith thought there was a need for

alfalfas in the Midwestern United States that were 10 to 14 days earlier than the Flemish.”

Clearly, as summarized above and in the attached Exhibits, Barnes et al. established that the ‘Flemish’ (i.e., ‘French’) alfalfa germplasm was well known and characterized to those skilled in the art of alfalfa breeding at least more than three decades before the priority filing date of the instant application. Barnes et al. demonstrate that as early as 1977 one skilled in the art can calculate almost the exact genetic contribution of the ‘Flemish’ (i.e., ‘French’) germplasm in any particular alfalfa variety. Furthermore, and importantly to the instant claimed invention, Barnes et al. stated a need for adapted ‘Flemish’ types of alfalfa germplasm for use in the United States.<sup>2</sup>

Miller and Melton (1983; 498 pages) describe ‘Flemish’ (i.e., ‘French’) alfalfas, and varieties developed from ‘Flemish’ alfalfas in even greater detail. See, for example:

- Page 3, under the section titled Origin of Germplasm in North American Alfalfa, it states that “[U]nited States alfalfa workers have tended to group all ‘French’ alfalfas into the ‘Flemish’ [sic] type. However, Bolton (3) and most ‘French’ workers, distinguish among ‘Flamande’, ‘Poitou’, and ‘Provence’ Types. The Introduction of ‘DuPuits’ popularized the Flemish types in the U.S. and is a Flamande type. ‘Poitou’ is more similar to the variegated types. ‘Provence’ is the least dormant of the ‘French’ types. It is felt that this distinction is significant because the contribution of the ‘Provence’ types to South African, Australian, and New Zealand alfalfas.”
- Table 1, pages 6-7, describes the ‘Flemish’ source as “Flamande”, “Poitou” and “Provence”;<sup>3</sup> the “Area of origin” for ‘Flemish’ sources as France; provides a summary of the germplasm’s characteristics; and lists the alfalfa varieties “DuPuits, Alta, Cardinal, Flandria, Socheville, Provence, Europa, and Tuna” as having ‘Flemish’ germplasm in their genetic backgrounds. Applicants want to respectfully point out that ‘Flemish’ is the only dormant or moderately dormant source listed with fast recovery (or

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<sup>1</sup> Please note that ‘Europa’ is known by those skilled in alfalfa breeding as synonymous with ‘Europe’.

<sup>2</sup> Such a disclosure is merely an invitation to experiment but does indicate the long-felt need for the present invention.

rapid growth) except for the non-hardy alfalfa sources (Peruvian, Indian, African, and/or Arabian). In addition, none of the other sources in the table lists upright or standability of lodging tolerance as a characteristic.

- Table 3, pages 17-25, includes information on the registration of three alfalfa cultivars known to have 'Flemish' backgrounds: Cardinal (page 17), Europa (page 18) and Tuna (page 19).
- Table 5, pages 35-38, describes DuPuits (100% 'Flemish') as a susceptible check for the disease Verticillium wilt. Therefore, this 'Flemish' line has been known and used as a check variety for many years by those skilled in the art of alfalfa breeding.
- Table 8, pages 42-298, describes several alfalfa cultivars that are 'French' lines, or developed from 'French' lines, based on fall dormancy, genetic origin, and levels of pest resistance, which are summarized in Exhibit C attached hereto.
- Table 9, pages 299-313, provides a list of names and descriptions of non-North American alfalfa cultivars and ecotypes. Several cultivars in Table 9 originated from 'Flemish' types alfalfa – a summary is provided in Exhibit D attached hereto.

These lists and descriptions in Barnes et al. (1977) and Miller and Melton (1983) clearly demonstrate that 'French' (and 'Flemish') type alfalfa germplasms were well known to those skilled in the art of alfalfa breeding well before the priority filing date of the instant invention, and, also illustrate that such alfalfa germplasms have been used by most if not all private and public breeders both domestically and worldwide to develop new cultivars. Thus, a person of ordinary skills in the art would have understood at least by November 1, 2002, what is meant when Applicants refer to 'French' (and 'Flemish') type alfalfa germplasm.

Furthermore, some of the very same 'French' (and 'Flemish') alfalfa types listed and described by Barnes et al. and Miller and Melton were used as check varieties by applicants. See, for example, the use of 'Europe' as a check in the results shown in Tables 4, 6b, 7c, 7d, 7e, 7g, 10b, 14b and 18b. In addition, the as-filed specification lists 'Mercedes' as a "Flemish type" alfalfa at page 4, lines 17-19, and provides data wherein this alfalfa type is also used as a check.

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<sup>3</sup> The as-filed specification states "The "French" types of alfalfa include 'Flemish' (or Flamande), Poitou, and Provence" (page 4, line 17) – the very same description provided by Miller and Melton as cited here.

See, for example, Tables 4, 7c and 7e. The as-filed specification also lists ‘Daisy’, ‘Diane’, and ‘Marshal’ as ‘French’/‘Flemish’ lines, which were used as checks, see, Table 4, Table 7d, and Table 7e.

The Examiner cited *In re Wands*, 858F.2d 731, 8 USPQ2d 1400 (Fed. Cir. 1988), listing eight considerations for determining whether or not undue experimentation would be necessary to practice an invention.

(1) the breadth of the claims

Claim 15 has been newly amended to claim *Medicago sativa* alfalfa varieties having 8% or greater faster recovery after spring green-up or after harvest and 15% or greater more erect stems at late bloom compared to an adapted check, wherein said varieties comprise ‘French’ alfalfa germplasm. Therefore, the breadth of the claims is commensurate with the teaching of the specification, as recognized by the Examiner.

(2) the nature of the invention

The amended claims are directed to *Medicago sativa* alfalfa varieties having 8% or greater faster recovery after spring green-up or after harvest and 15% or greater more erect stems at late bloom compared to an adapted check, wherein said varieties comprise ‘French’ alfalfa germplasm. The as-filed specification fully supports the scope of the claim and one skilled in the art of alfalfa breeding understands what alfalfa germplasm constitutes ‘French’ type alfalfa germplasm, as explained in some detail above.

(3) the state of the prior art

The Examiner admitted that the state of the prior art does not teach *Medicago sativa* alfalfa varieties having 8% or greater faster recovery after spring green-up or after harvest and 15% or greater more erect stems at late bloom compared to an adapted check. Accordingly, the amended claims are clearly not taught by prior art.

(4) the relative skill of those in the art

Applicant agrees with the Examiner that the relative skill in breeding art is high.

(5) the predictability or unpredictability of the art

On page 8 of the Office Action, under item (5), the Examiner states “[I]t is predictable for one skilled in the art to make the claimed invention ... can be used to produce the claimed invention.” Applicants agree with this statement as one skilled in the art would be able to use

‘French’ lines to make the claimed invention following the detailed description and the examples of the specification.

(6) the amount of direction or guidance presented

The Examiner alleges that the specification does not provide any guidance regarding the ‘French’ lines used to produce the claimed invention and it is unclear if all ‘French’ lines could be used to produce the claimed invention. As described in detail above, ‘French’ (and ‘Flemish’) type alfalfa germplasms were well known, and available to those skilled in the art of alfalfa breeding well before the priority filing date of the instant invention, and, such alfalfa germplasms have been used by most if not all private and public breeders both domestically and worldwide to develop new cultivars. The specification provides sufficient direction and guidance for one skilled in the art to make and use the present claimed invention.

(7) the presence or absence of working examples of the invention

As the Examiner admitted, the specification provides working examples of alfalfa varieties having the claimed characteristics wherein said varieties comprise ‘French’ germplasm in their genetic background. Therefore, enough working examples were provided in the specification.

(8) the quantity of experimentation necessary

As described above, the specification along with the publications incorporated by reference (i.e., Barnes et al. (1977) and Miller and Melton (1983)), provides sufficient guidance for one skilled in the art to use ‘French’ lines in the initial steps of the breeding process. In addition, the ‘French’ lines have been available and well known to the public for many years.

As evidenced by the summary and examples provided above, Applicants’ as-filed specification, and the state of the art of alfalfa breeding as it existed prior to November 1, 2002, one skilled in the art clearly comprehended what constituted ‘French’ (and ‘Flemish’) alfalfa germplasm and utilized such germplasm in their breeding programs or as appropriate check varieties on a regular and on-going basis. Thus, applicants’ disclosed and presently claimed invention is fully and adequately enabled as of its priority filing date. In view of this evidence of enablement of the presently claimed invention, the Examiner is respectfully requested to withdraw this rejection and issue the pending claims in light of the amendments and the evidence provided.



#### IV. Claim Rejections – 35 USC § 102(b)/103(a)

Claims 2-4, 6-19 and 30-31 are rejected under 35 USC § 102(b) as allegedly being anticipated by or, in the alternative, under 35 USC § 103(a) as allegedly being obvious over Cluff et al. (U.S. Patent No. 6,143,951 , November 7, 2000). The Examiner alleges that Cluff et al. teach WL-C290 having very fast recovery after harvest and excellent standability under sprinkler irrigation.

As an initial matter, Applicants appreciate the Examiner's statement on page 8 of the Office Action that "[T]he state of the prior art does not teach *Medicago sativa* alfalfa varieties with 8% or greater faster recovery after spring green-up or after harvest and/or 15% or greater more erect stems at late bloom compared to an adapted check."

The Examiner has dismissed the experimental evidence provided in the previously-submitted Reich Declaration which demonstrated that 'WL-C290' is more susceptible to lodging under sprinkler irrigation than the alfalfa varieties claimed in the present invention. The Examiner stated the following in relationship to the Reich Declaration (Office Action, paragraph bridging pages 13-14):

"The 'Reich Declaration' does not provide any data to demonstrate that the plant of the cited reference, WL-C290, did not have 15% or greater more erect stems at late bloom compared to an adapted check variety as determined by the method of step (b), steps 1-5. The data provided by the 'Reich Declaration' fails to demonstrate that the differences in results are unexpected and unobvious and of both statistical and practical significance because it does not compare the claimed plants with the cited reference plant using the claimed steps used to determine percentage of erect stems."

Applicants hereby provide the Examiner with a Declaration Under 37 C.F.R. § 1.132 by Dr. David W. Johnson ("the Johnson Declaration"), an inventor of the present invention and an officer of the assignor.

The Johnson Declaration provides experimental data for an alfalfa standability trial specifically designed to address the Examiner's concerns as stated above. As discussed in the Johnson Declaration, the methods of rating and calculating standability were the same as those described in the present application.

The 'Standability' scores (columns 2-3), the '2010 Average' standability scores (column 4) and the calculation of the '% Greater Erect Stems Compared to Checks' (column 5) provided in Table 1 of the Johnson Declaration were all determined according to the steps of pending claim 15, b), (1)-(5). As definitively demonstrated in Table 1, six lines developed according to the present invention all had more than 275% greater erect stems compared to the check varieties listed in claim 15.<sup>4</sup> In stark contrast to these results for the exemplary lines of the present invention, the prior art alfalfa line 'WL-C290' cited by the Examiner had only 12.5% greater erect stems as compared to the same check varieties. Independent claims 15 and 30 of the present invention require the claimed alfalfa varieties to have 15% or more greater erect stems when compared to the same check varieties. The Johnson Declaration clearly establishes that the claimed invention is a great improvement over the prior art cited by the Examiner. Clearly, this data demonstrates that the alfalfa plants claimed herein are not anticipated by or obvious in view of 'WL-C290.'

Thus, the Examiner is respectfully requested to withdraw this rejection and issue the pending claims.

### CONCLUSION

The Examiner is invited to contact the undersigned if necessary to advance prosecution of this application.

Applicants look forward to allowance of the pending claims or appealing this to the Board of Patent Appeals and Interferences for their consideration of Applicants' responses to each of the rejections, as discussed above.

The Commissioner is hereby authorized to charge any appropriate fees under 37 C.F.R. §§ 1.16, 1.17 and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 50-1283. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 CFR §1.136(a)(3).

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<sup>4</sup> The commercial check varieties listed in claim 15 include 'WinterGold', 'HybriForce 400', 'WL 319HQ', and

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**EXHIBIT A**

Alfalfa cultivars listed in Table 1 of Barnes et al., 1977 with Flemish/Flamande origin:

Variety	Developing or introducing agency	Year seed available	Varietal origin of parental germplasm
Alfa	Intro from Sweden	1955	Flamande (Swedish selection)
Apalachee	USDA and N.C. AES	1973	Dupuits, Flamande, Lahontan (Clone E-900) C900 × 40 plants Dupuits and Flamade
Dupuits	Tourneur Freres	1947	Flemish
Europa	LaMaison Florimond	1965	Flemish
Orchies	Calapproved Seed Growers	1964	Flemish (French origin 'Ochesienne')
Pacer	Land O'lakes	1976	Dawson, Flemish, Saranac, Scout, Vernal, Weevlchek
Sranac	Cornell University	1965	A225, Alfa, DuPuits, Flamande
Socheville	Intro from France	1952	Flemish
Stride	Caladino Farm Seeds	1966	Flemish
Talent	Intro from France	1948	Flemish
Tempo	Farmers Forage Res. Coop.	1970	Buffalo, 'Flemish' × Vernal, Ranger.
Vista	Cal/West Seeds	1976	Flemish
Warrior	Northrup, King & Co.	1962	Flemish, Winterhardy U.S. germplasm sources
WL306	Waterman-Loommis Co.	1970	Atlantic, M. falcata × Vernal, Flemish, WL303, WL304, WL202, WL210.
WL309	Waterman-Loommis Co.	1973	Same as WL306
530	arnold-Thomas Seed Service	1973	Flemish, Sranac, Vernal.
Tuna	Sweedish Seed Assoc.	1963	Franconian

**EXHIBIT B**

Alfalfa cultivars listed in Table 2 of Barnes et al., 1977 with at least some portion of 'Flemish' germplasm:

Variety	Year seed available	Percent of source from Flemish
Alfa	1955	100
A-24	1968	75
Anchor	1972	98
Apalachee	1973	88
Apex	1966	100
Arc	1974	5
Cardinal	1964	100
Cherokee	1962	11
Chimo	1973	33
Citation	1975	55
Dupuits	1947	100
Europa	1965	100
G777	1973	100
Glacier	1964	100
Gladiator	1975	5
Honeoye	1976	87
Lew	1976	48
Liberty	1977	5
Nugget	1975	50
Pacer	1976	56
Polar I	1975	17
Saranac	1965	87
Saranac AR	1976	87
Socheville	1952	100
Stride	1966	100
Talent	1948	100
Team	1970	5
Tempo	1970	25
Thor	1971	67
Tuna	1963	100
Vista	1976	100
Warrior	1962	50
WL219	1976	18
WL306	1970	10
WL309	1973	10
WL450	1974	2
WL501R	1974	2
WL600	1974	2
530	1973	81

**EXHIBIT C**Alfalfa cultivars listed in Table 8 of Miller and Melton, 1983 with 'Flemish' origin<sup>5</sup>

Variety	Page No. of Miller and Melton, 1983	Origin
Alfa	50-51	Flamande (Intro from Sweden)
Alfa II	50-51	Flamande (Intro from Sweden)
Anchor	54-55	Alfa 44%, Dupuits 33%, Apex 11%, Saranac 11%
Angus	54-55	DuPuits, M. media (Flemish)
Apalachee	56-57	DuPuits, Flamande, Lahontan
Apex	56-57	Alfa 70%, DuPuits 20%, Tuna 10%
Atlas	70-71	Anchor, Saranac, Beltsville 1 An4, Beltsville 2 An4, Titan, Vernal, Weevlchek, Beltsville 3 An4 (Flemish)
Blazer (P455 pr P455a)	78-79	Flemish 10%, 'Flemish' × Vernal 10%
Cardinal (Touneur 501, N-501)	84-85	Intro from France, "Flamande Alf"
Cherokee (B-8, N.C. MSB)	84-85	Buffala, DuPuits, Kansas Common, Oklahoma Common, Williamsburg, Kansa Syn (89% Chilean, 11% Flemish)
Chimo	86-87	Flemish
Chimo (21)	86-87	Cayuga, Vernal, Saranac (Flemish)
Citation	88-89	Saranac, Alfa, Narragasett, Vernal, DuPuits
DeKalb Brand 120 (LL159)	100-101	Titan 11%, Valor 11%, Saranac 11%, MnPB1 11%; [Weevlcheck, Flemish, Vernal, Titan] -55%
DeKalb Brand 131 (LL159)	102-103	Vernal × Cody × Stride (Flemish)
Dupuits	110-111	Intro from France (Flemish)
Elga	114-115	Intro from France (Flemish)
Embro A-24 (A-24)	116-117	Alfa, Buffalo, CuPuits, Socheville (75% Flemish, 25% Chilean)
Embro A-35 (A-35)	116-117	(Flemish)
Emerande	116-117	Intro from France (Flemish)
Epic	118-119	Valor, Pacer, MnPD1, Washoe, Alfa, Saranac, Flemish, Titan
Europa (Erope, A-10)	118-119	Intro from France (Flemish)
FD-100 (Florimand, Desprez-100)	122-123	Intro from France
Flandria	122-123	Intro from France (Flemish)
G777 (KO-8)	126-127	Cardinal (Flemish)
Glacier (Tourner 505, N-9-505)	130-131	Intro from France
Gladiator (KO-2)	132-133	37 Chilean, 31% M. varia, 20% Turkistan, 5% Flemish
Granada	132-133	Cuf 101 100% (53% African, 23% Indian, 11% Turkistan, 7% Chilean, 2% Peruvian, 2% M. varij, 1% Ladak, 1% Flemish)
Honeoye	138-139	87% Flemish, 7% M. varia, 2% Ladak, 2% Turkistan, 2% Chilean
Hybrid Milfeuil	138-139	Intro from France (Flemish)
Kaw	144-145	Intro from southeastern France, "Provence". Later

<sup>5</sup> Please Note: Pages 6-7 of Miller and Melton, 1983 indicate at least the following cultivars are considered to be 'Flemish' types: DuPuits, Europa, Alta, Tuna, Cardinal, Flandria, Socheville, and Provence.

		suggested to be of Turkistan origin
Milfeuil (Hybrid Milfeuil)	158-159	Intro from France
Multileaf (ML)	160-161	Narragansett, DuPuits, Socheville, A-225, Vernal
Nugget	174-175	Vernal, Alfa, Tuna (Flemish)
Olympic (NAPB43)	174-175	Anchor, Tempo, Srananc, Titan, Weevlchek, Vernal. Kanza, Dawson, Cody (Flemish)
Orchies	176-177	Intro from France "Orchesienne"
Pacer (FN244)	178-179	Vernal 12%, Scout 12%, Dawson 12%, Saranac 12%, Weevlchek 12%, 'Flemish' types 36% (56% Flemish, 18% M. vania, 11% Turkistan, 9% Ladak, 3% Chilean, 3% M. falcata)
PAT-30	180-181	(Flemish)
Peak	180-181	Sarana 22%, Pacer 11%, Valor 11%, [Buffalo × Titan × Alfa × Weevlchek × Flemish]-55%
Pioneer Brand 530	188-189	Flemish types, Saranac, Vernal
Pioneer Brand 532	190-191	Pioneer Brand 530, 'Flemish' types
Pioneer Brand 555	190-191	Kanza 36%, 'Flemish' 26%, Dormant type 24%, Non- Dormant types 7%
Primal	194-195	Thor (Flemish)
Princess	196-197	(Flemish)
Saranac (WRF)	206-207	A225, Alfa, DuPuits, Flamande
Saranac AR (Anth. Res Saranac)	208-209	Saranac (Beltsville 2-AN4)
Shenandoah	212-213	Flemish
Socheville	212-213	Intro from France, Flamande alf (Flemish)
SX-418 (A-38)	220-221	Beltsville 2AN4, Saranac (Flemish)
Talent	222-223	Intro from France (F.C. 19274)
Team	222-223	Atlantic, Dupuits, Narragansett, Rhizoma (37% Chilean, 31% M. varia, 20% Turkistan, 5% Flemish, 4% M. falcata, 2% Ladak)
Tempo (FFR DC2)	222-223	Buffalo, 'Flemish' × Vernal, Ranger
Thor	224-225	Saranac, Cardinal, Cardinal × Glacier (Flemish)
Tourneur 501	226-227	Intro from France "Flamande alf" (Flemish)
Trident	230-231	Apollo, Flemish, WL 318
Trumpetor	230-231	Flemish × Glacier, Arc
Tuna	230-231	Intro from Sweden <sup>1</sup>
Vista	240-241	(Flemish)
Warotte	240-241	Intro from France (Flemish)
Warrior (No 507)	240-241	(Flemish)
Wilstar 961	244-245	Saranac, Cayuga, Culver, Kanza, Flemish, PI from Turkey
WL219	248-249	winterhardy germplasm sources (39% M. varia, 18% Flemish, 14% Turkistan, 11% Ladak, 9% M. falcata)
WL306	252-253	Atlantic, M. falcata × Vernal, Flemish, WL303 WL 304, WL202, WL210 (45% M. varia, 11% M. falcata, 11% Ladak, 11% Turkistan, 10% Flemish, 7% Chilean)
WL309	254-255	Atlantic, M. falcata × Vernal, Flemish, WL303 WL 304, WL202, WL210
WL450 (Cage 896-25)	260-261	WL504 96%, 'Flemish' varieties 2.4%, PI141462 1% (33% Indian, 22% Turkistan, 20% Chilean, 9% African, 9% M. varia)

**EXHIBIT D**

Alfalfa cultivars listed in Table 9 of Miller and Melton, 1983

Country	Page No. of Miller and Melton, 1983	Characteristics	Regional Ecotype	Introduced/Developed Varieties	Origin
Australia	299	<u>Erect, Rapid recovery, Early Flowering</u> ; SAA-S	Hunter River		Provence
Austria	300	Drought Tolerance		DuPuits	France
Begium	300	Resembles Flamande	Harmignies	Franconian	Germany
Bulgaria	300	Developed from wild ecotypes; <u>Rapid recovery</u>		Pleven 1	
				Pleven 2	
				Dupuits	
				Poitou	
Czechoslovakia	301			Provence	
France	301	<u>Erect</u> , tall growing, thick stems; low percentage of fascicled roots; Bacterial wilt-S; Common leaf spot – MR; Dormant to Semi-Dormant	Ornelong	Flamande alfalfas	
			Chartrainvilliers		
			Flandria		
			Socheville		
			W. 268		
			D. 100		
			Ile de France		
			Emeraude		
			DuPuits		
			Gamma		
	301	similar to variegated alfalfa, Semi Dormant	Marais Poitevin	Poutou (Verdee or Marais)	
	301	Slender stems, slow recovery; tolerant to drought; susceptible to Sclerotinia trifoliorum; semi-erect; Semi-Dormant to Dormant	Provence (Lucerne du Midi)		
India	302	<u>Erect</u> , vigorous, leafy	Persian		
Italy	303	<u>Rapid and tall growth</u> , both dormant and semi-dormant	Lodigiana		
			Leonicea		
			Polesana		
			Emiliana o Ramagnola		



Country	Page No. of Miller and Melton, 1983	Characteristics	Regional Ecotype	Introduced/Developed Varieties	Origin
Mexico	304	non-dormant, high seed set, <u>rapid growth</u> , tall, broad leaves, persistent	Sabina		
			Umbra o Toscana		
			Marchigiana		
			Pugliese		
			Molisana		
			Siciliana		
			Friulana		
			Valdura		
			Hojaseo		
			Tanverde		
			Oaxaca		
			Atlixo		
			Apaseo		
			Tanhuato		
Norway Peru	304 305	<u>Upright</u> , semi-dormant		San Isidro	
				Puebla 76	
				Mixteca 76	
				Bajio 76	
South Africa	306			India 76	
				Caliverde	
				Moapa	
				Arizona Chilean	
Sweden	306	dormant		Valenciana	
				Tuna	
			Hairy Peruvian		
			South African Provence		Provence
South Africa	306		South African Standard		Hunter river X
					Provence
			Cape lucerne		Provence Alfalfa
Sweden	306			Alfa	Flammish

Country	Page No. of Miller and Melton, 1983	Characteristics	Regional Ecotype	Introduced/Developed Varieties	Origin
				Alfa II	
				Vertus	
				Tuna	
				Grimm	
Switzerland	306			Flemish types	
				Italian types	
				Hungarian types	